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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/527,873	03/17/2000	Sohaila Shooshtarian	AGX-37	4182

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EXAMINER

LEE, HSIEN MING

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 01/30/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/527,873

Applicant(s)

SHOOSHTARIAN ET AL.

Examiner

Hsien-Ming Lee

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 January 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1, 2 and 4-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2 and 4-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1, 5, 8-10, 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Thankur et al. ( US 5,926,742).

Thankur et al. in Figs. 4, 5 and related text expressly and impliedly teaches the claimed method for heat treating a semiconductor wafer, comprising :

- \* placing a semiconductor 10 in a thermal processing chamber 12 that is in communication with a plurality of lamps 18 ( tungsten-halogen lamps), the semiconductor wafer 10 defining a plurality of localized regions ( Fig. 5) along a radical axis;
- \* adjusting the temperature of the semiconductor wafer 10 to a predetermined temperature according to a predetermined heat cycle including a heating stage in which the

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semiconductor wafer is heated by the plurality of lamps 18 and the radiation energy generated by the lamps can be selectively varied ;

\* during at least one stage of the predetermined heat cycle, providing a gas through gas injection head 22 to selectively control the localized temperature of at least one localized regions of the semiconductor wafer to minimize temperature deviation of the at least one localized region from the predetermined temperature. The localized regions comprises less than about 50% or 25% or 15% of a cross-section of the wafer. The predetermined heat cycle comprises a cooling stage.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-2, 5, 8-13 are rejected under 35 U.S.C. 103(a) as obvious over Champetier et al. ( US 5,997,175) in view of Geyling et al. ( US 5,881,208).

Champetier et al. in Fig.1 and related text teaches the claimed method for heat treating a semiconductor wafer, comprising :

\* placing a semiconductor 14 in a thermal processing chamber 12 that is in communication with a plurality of lamps 24 ( tungsten-halogen lamps), the semiconductor wafer 14 defining a plurality of localized regions along a radical axis;

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- \* adjusting the temperature of the semiconductor wafer to a predetermined temperature according to a predetermined heat cycle including a heating stage in which the semiconductor wafer is heated by the plurality of lamps 24;
- \* during at least one stage of the predetermined heat cycle, providing a gas such as inert gas through gas inlet 18 to control the localized temperature of at least one localized regions of the semiconductor wafer to minimize temperature deviation of the at least one localized region from the predetermined temperature., i.e. during the heating stage control the localized temperature of plural locations of the wafer through a control system in communication with the radiation sensing devices and with the heat source, in which the controller can be configured to receive thermal radiation information from the radiation sensing device and based on the information to control the amount of heat being emitted by the heat source, which in turn would control the localized temperatures of the wafer ( col. 4, line 50 through col.5, line 3 ).

Champetier et al. do not expressly teach utilizing the gas to selectively control the temperature of at least one of the localized regions of the wafer to minimize temperature deviation. Geyling et al. in an analogous art of controlling temperature uniformity across the entire wafer during heating cycle teaches using a gas delivery system (Figs. 1-2, 3A, 3C ) to individually or selectively control the temperature ( col. 9, line 60 through col. 10, line 2) of at least one of the localized regions of the wafer to minimize temperature deviation. The gas delivery system can be shower heads with zonal control, combination of shower heads and microvalves, or structure made of entirely from array of microvalves ( col.13, lines 50-54), which can be used for selectively controlling the temperature of one of the localized regions of

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the wafer. The localized regions obviously comprises less than about 50% or 25% or 15% of a cross-section of the wafer, as evidenced by the annual zones 25a-25d ( Fig.3A) in Geyling.

At the time of the invention, one of ordinary skill in the art would have been motivated to modify the gas delivery system of Champetier by the gas delivery system of Geyling in which the system has a capability of selectively controlling the temperature at the localized regions of the wafer. The suggestion/motivation for doing so would be to use a better heating means to obtain a temperature uniformity across the entire wafer during heat treating.

With respect to claim 5, Champetier et al. teaches the step of controlling the flow rate of the gas ( col.11, lines 55-58).

With respect to claims 11 and 13, the combined teachings of Champetier and Geyling is able to manipulate the localized temperature during the heating and cooling stages by individually adjusting gas flow and heating energy using the plurality of the lamps of Champetier and the gas delivery system of Geyling.

5. Claims 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Champetier et al. ( '175) and Geyling et al. ( '208) as applied to claim 1 above, and further in view of Colelli et al. ( US 6,100,506).

The combined teachings of Champetier et al. and Geyling et al. substantially teaches the claimed method for heat treating a semiconductor wafer but does not expressly disclose that the temperature deviation is less than about 100C or about 25C. However, it would have been obvious to one of the ordinary skill in the art to appreciate that the temperature deviation on the semiconductor wafer need to be controlled far less than 25C during the heating and cooling


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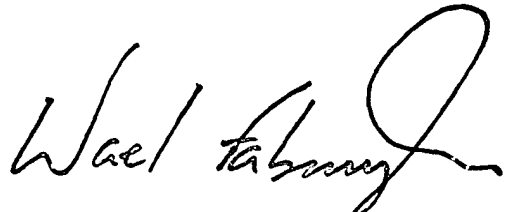
stages, as evidenced by Colelli et al. in which he shows that the temperature deviation ( $\Delta T$ ) across the wafer is controlled in the range of 0.3 C (col.3, lines 15-17).

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 703-305-7341. The examiner can normally be reached on M-F (9:00 ~ 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned is 703-305-0142.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

  
Hsien Ming Lee  
January 18, 2002

  
SUPERVISORY PRIMARY EXAMINER  
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